Stoller
Hanford Office

GJO-2004-607-TAC

C4207
Log Data Report

Borehole Information:

Borehole: C4207			**Site:** 216-U-1 and U-2 Cribs		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Dry		**GWL Date:**	02/26/2004
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
Not Available	Not Available	Feb. 2004	Not Available	50	Push Hole

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	0.3	6 5/8	5 1/2	9/16	0.3	50
Outside and inside casing diameters were measured using a caliper and a steel tape. The measurements were rounded to the nearest 1/16 in.						

Borehole Notes:

Using an acoustic depth device, depth-to-bottom measured 49.2 ft from top-of-casing. Zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 1E		**Type:**	SGLS (70%) 34TP40587A
Calibration Date:	01/2004	**Calibration Reference:**	GJO-2004-568-TAC	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 / Repeat		
Date	02/26/04	02/26/04	02/26/04		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	48.65	48.5	33.5		
Finish Depth (ft)	48.65	0.5	28.5		
Count Time (sec)	100	100	100		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	N/A[3]	1.0	1.0		
ft/min	N/A	N/A	N/A		
Pre-Verification	AE093CAB	AE093CAB	AE093CAB		
Start File	AE095000	AE095001	AE095050		
Finish File	AE095000	AE095049	AE095055		
Post-Verification	AE095CAA	AE095CAA	AE095CAA		

Log Run	1	2	3 / Repeat		
Depth Return Error (in.)	N/A	0	0		
Comments	Sonde tip is just touching bottom of borehole.	No fine-gain adjustment.	Repeat section.		

Logging Operation Notes:

Zero reference was ground surface. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118.

Analysis Notes:

Analyst:	Sobczyk	Date:	3/05/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectrum as compared to the pre-run verification spectrum for the day were between 1.9 percent lower and 7.1 percent higher at the end of the day. Examinations of spectra indicate that the detector functioned normally during logging.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectrum was used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G1EJan04.xls). Zero reference was the ground surface. Based on the field measurements, the casing configuration was assumed as one string of 6-in. casing with a thickness of 9/16 in. to 48.65 ft (total logging depth). Dead time corrections were applied when dead time surpassed 10 percent. A water correction was not required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs and ^{238}U were the man-made radionuclides detected in this borehole. ^{137}Cs was detected in the intervals between 0.5 to 3.5 ft and 30.5 to 32.5 ft with concentrations ranging from the 0.4 to 6 pCi/g. The maximum concentration was measured at 31.5 ft. ^{238}U, based on the 1001-keV photopeak, was detected at 31.5, 41.5, and 42.5 ft with concentrations of 24, 32, and 25 pCi/g, respectively.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 609, 1461, 1764, and 2614 keV and for the man-made radionuclides (^{137}Cs and ^{238}U) at 662 and 1001 keV.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable

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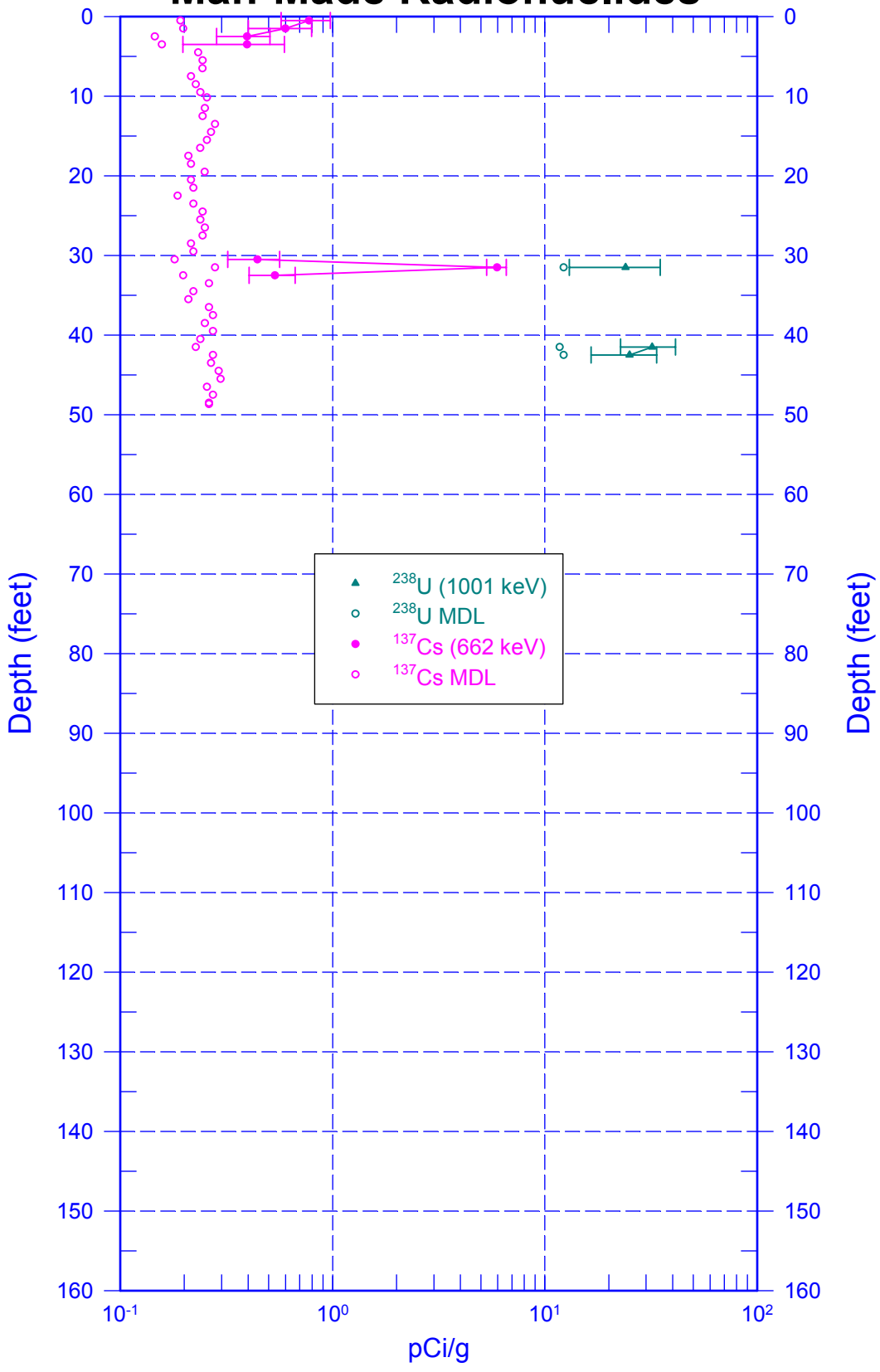
Man-Made Radionuclides



Zero Reference = Ground Surface

Date of Last Logging Run
2/26/2004

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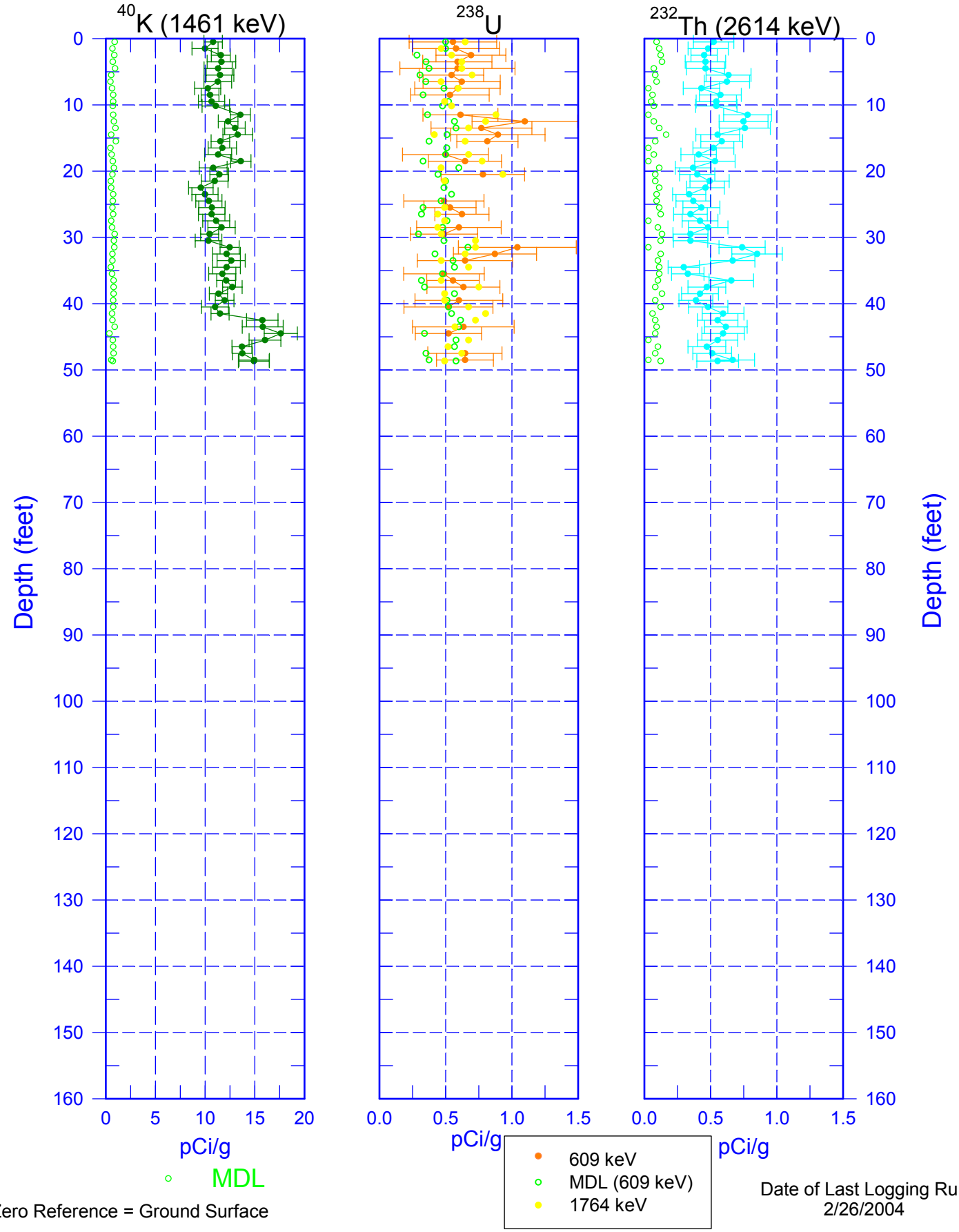
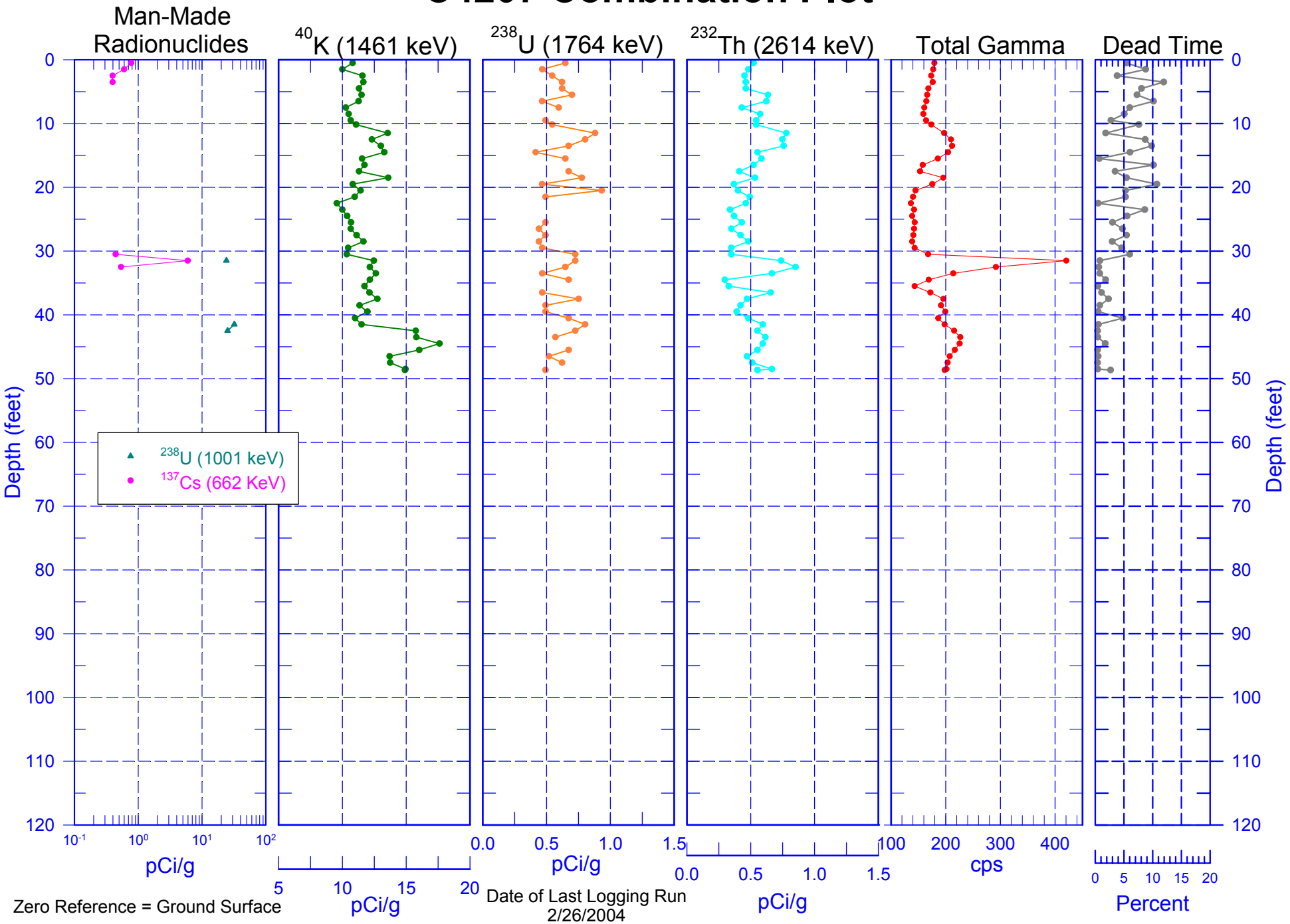
Natural Gamma Logs

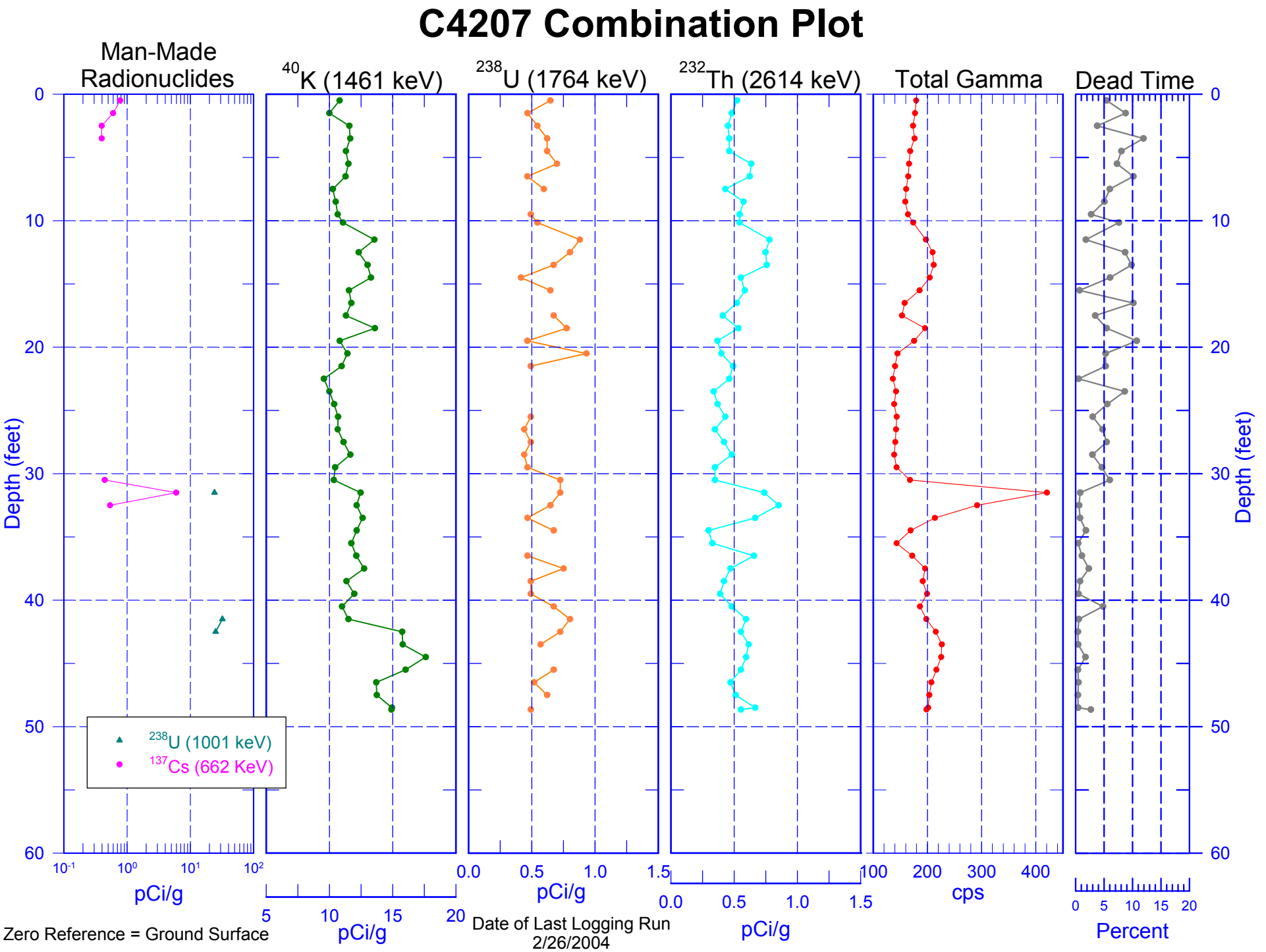


Zero Reference = Ground Surface

Date of Last Logging Run
2/26/2004

C4207 Combination Plot




C4207 Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Dead Time
Depth (feet)
0
10
20
30
40
50
60
238U (1001 keV)
137Cs (662 KeV)
10-1
100
101
102
pCi/g
5
10
15
20
pCi/g
0.0
0.5
1.0
1.5
pCi/g
0.0
0.5
1.0
1.5
pCi/g
100
200
300
400
cps
0
5
10
15
20
Percent
Zero Reference = Ground Surface
Date of Last Logging Run
2/26/2004

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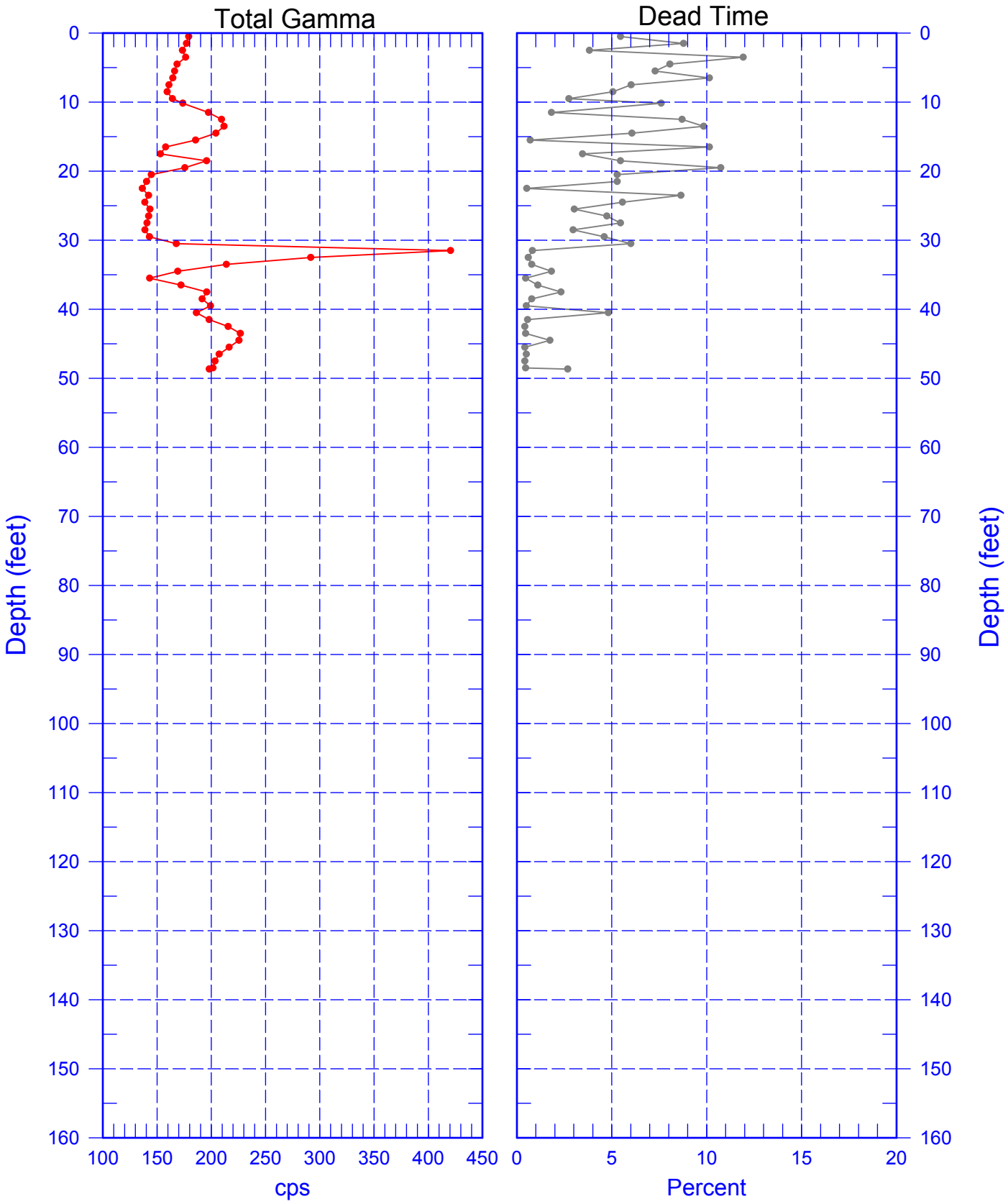
Total Gamma & Dead Time



Zero Reference = Ground Surface
Date of Last Logging Run
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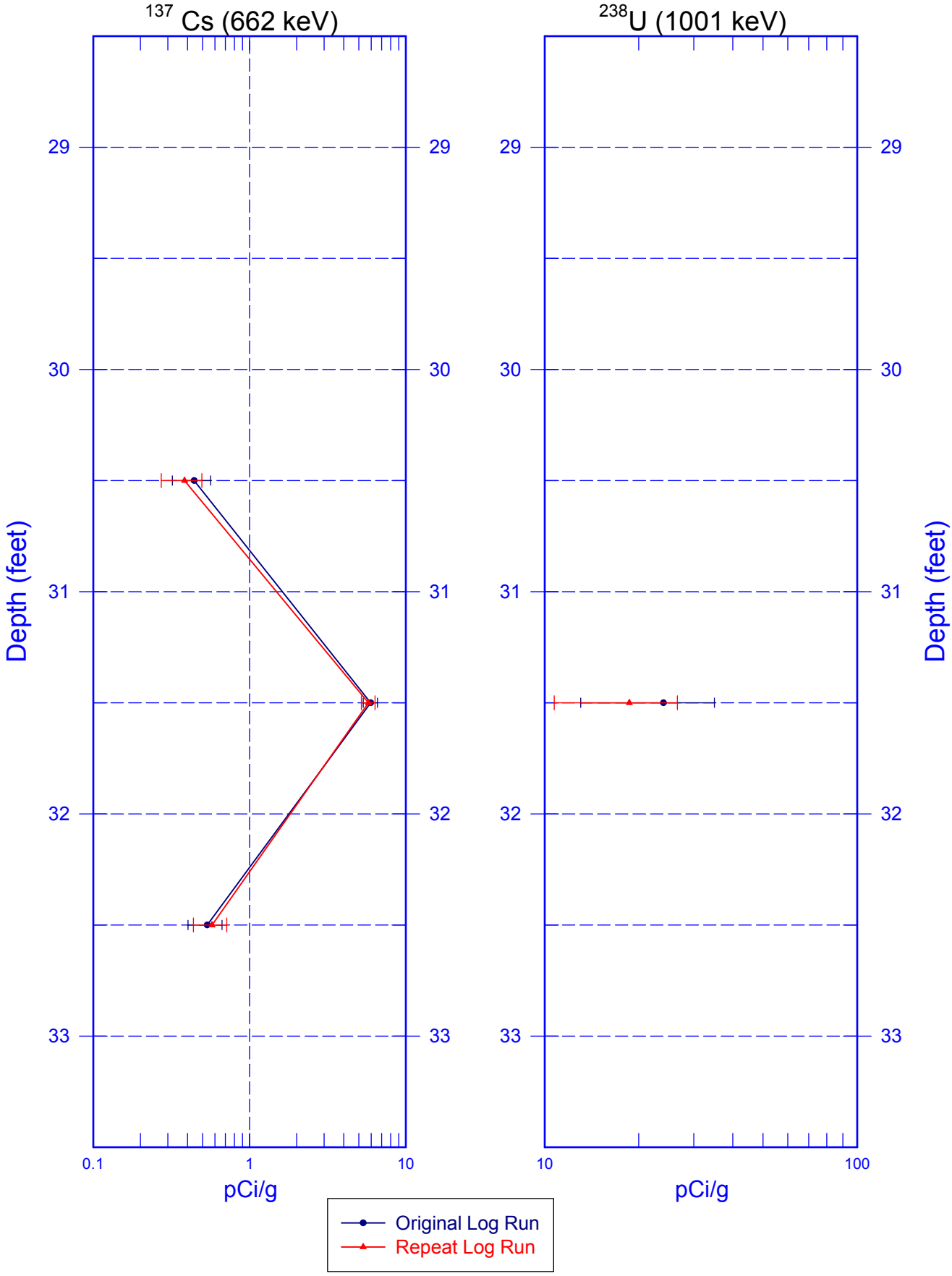
Rerun of Man-Made Radionuclides



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Rerun of Natural Gamma Logs (33.5 to 28.5 ft)